Robonaut RoboSim	INNOVATION - 2004	
	David Christianson	08 / 20 / 04

ROBONAUT

ROBOSIM

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Robonaut:

a highly dexterous anthropomorphic robotic system

RoboSim:

a computer simulation of the capabilities of Robonaut

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Robonaut: what is it?

A humanoid robot developed by NASA-Johnson Space Center and the Defense Advanced Research Projects Agency (DARPA).

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Robonaut: why?

To develop and demonstrate a robotic system that can function as an EVA astronaut.

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Robonaut: capabilities

In some areas, it has reduced dexterity and performance as compared to a suited astronaut.

In other areas, it is superior to a suited astronaut.

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Robonauts:

Unit A: fixed base: 43 – Degrees of Freedom (DOF)

Unit B: motion base: 47 - DOF

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Robonaut: physical description

The size of an astronaut in a space suit.

Two five-fingered hands.

Two arms.

One head.

One torso.

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Robonaut: hands

Designed to operate tools used by suited astronauts during EVA.

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Robonaut: hands

Wrist:	2-DOF
Thumb:	3-DOF
First finger (index):	3-DOF
Second finger (middle):	3-DOF
Third finger (ring):	1-DOF
Fourth finger (pinkie):	1-DOF
Palm:	1-DOF

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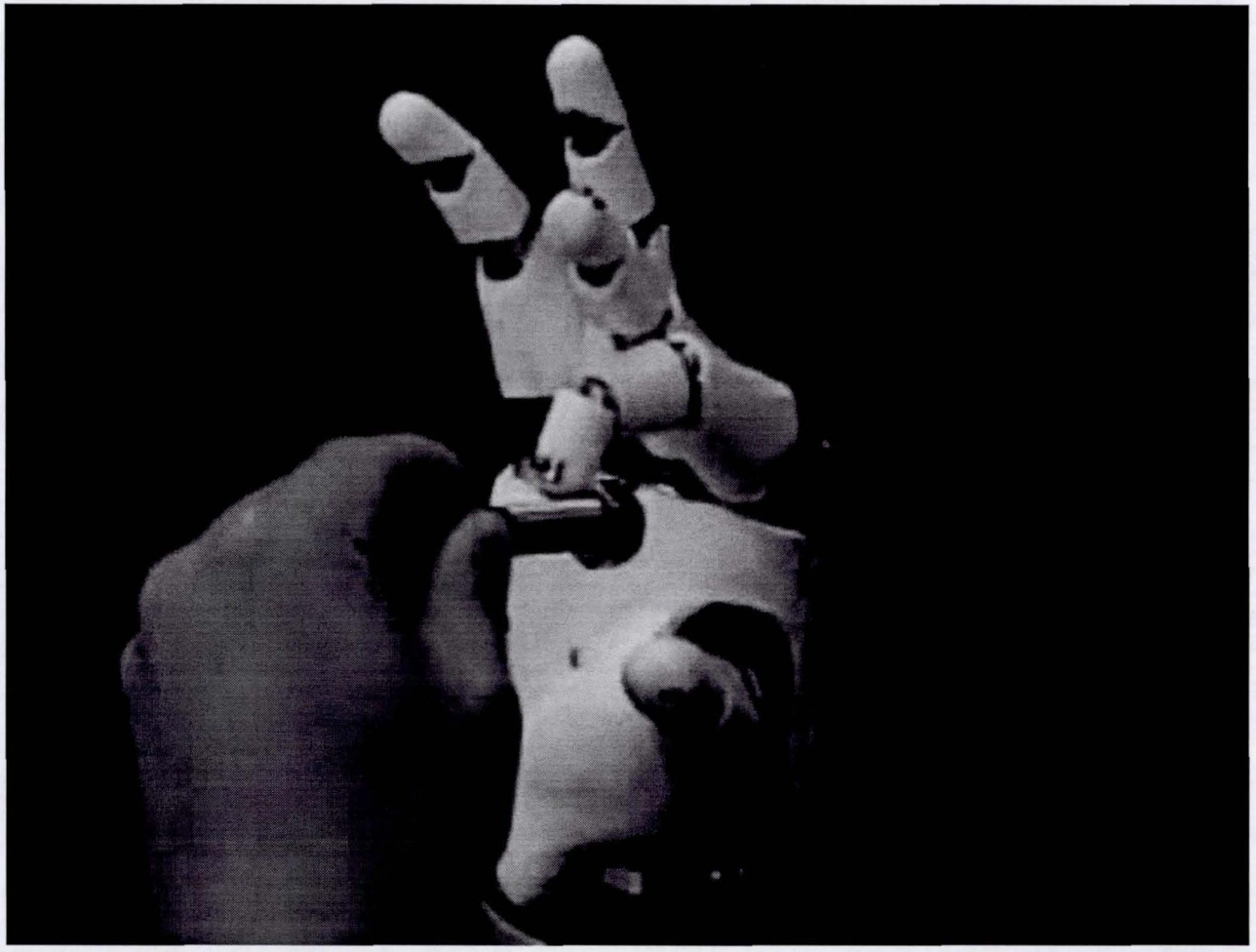

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Robonaut: arm

Designed for

human equivalent strength

human scale reach

fine motion

high bandwidth dynamic response

range of motion that exceeds that of a human limb

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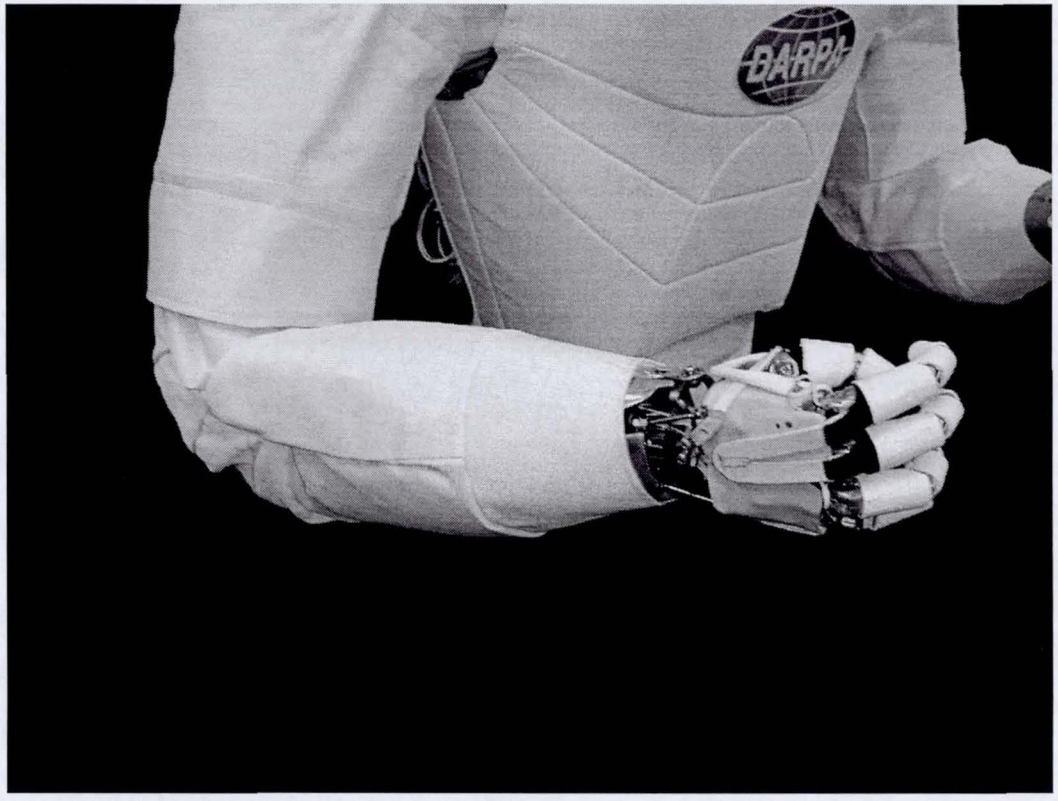

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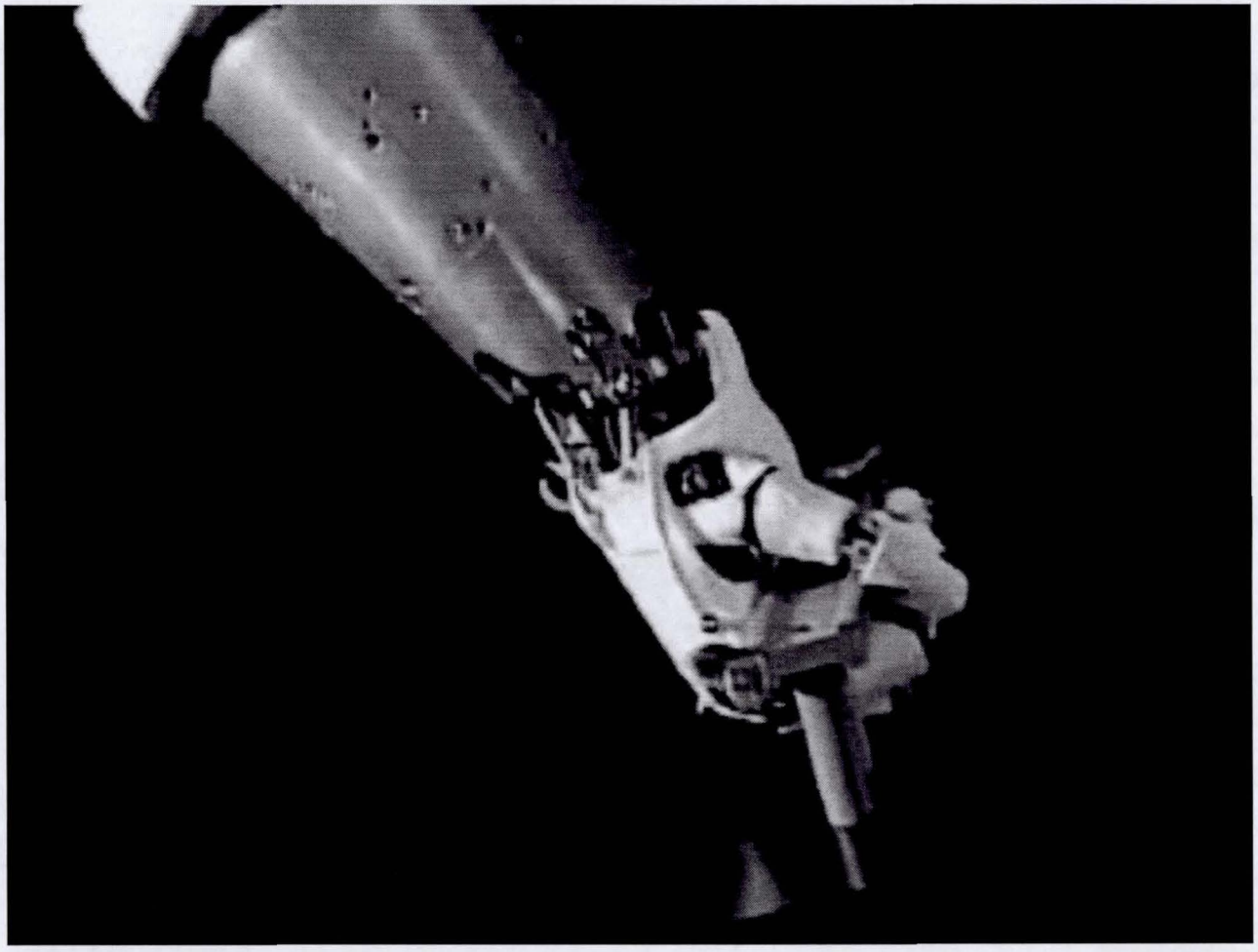

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Robonaut: head

articulated neck

two color cameras deliver stereo vision

interocular distance matches typical human eye spacing

focal distance at arms length

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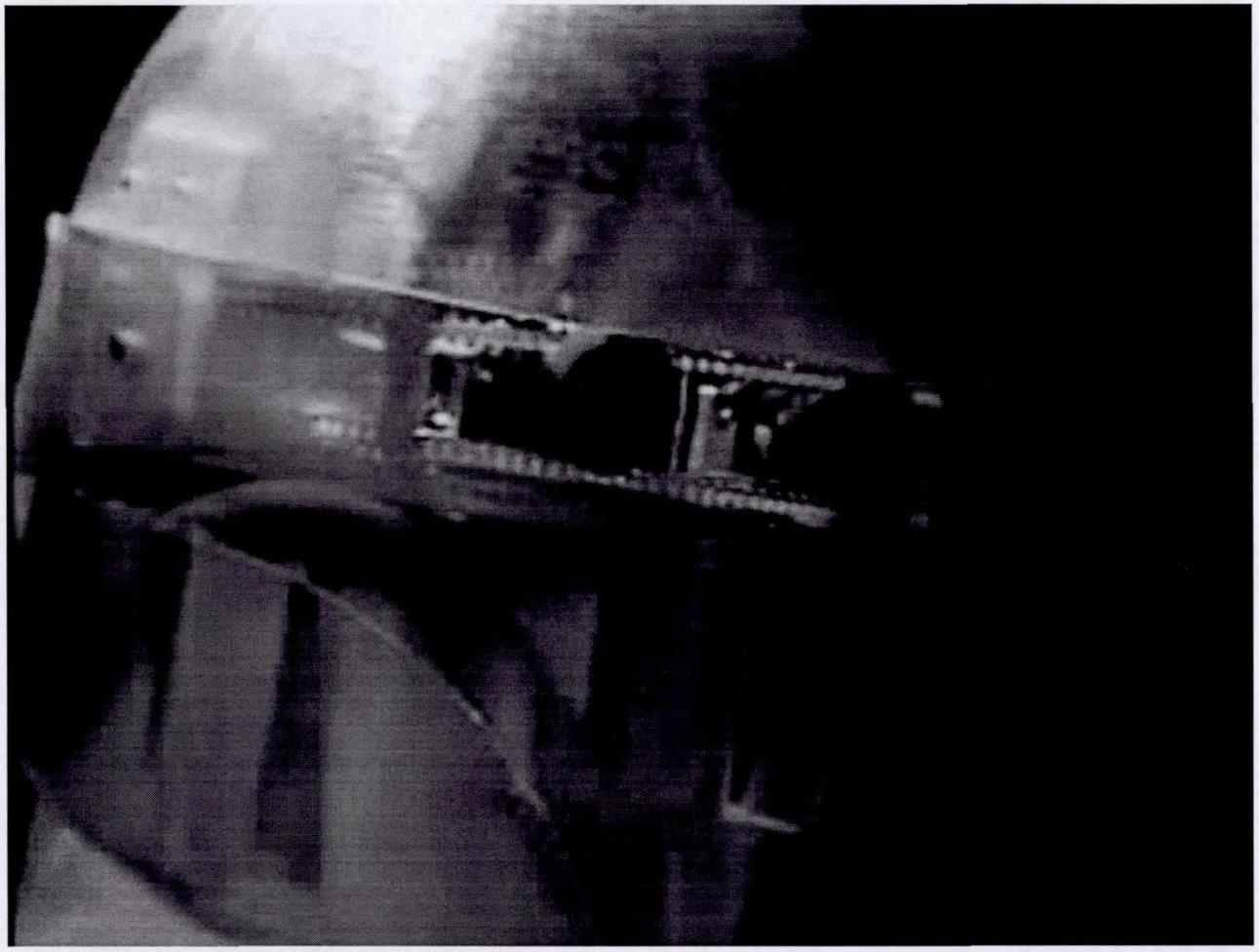

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Robonaut: control

most used: telepresence

a human operator controls the action of a remotely operated Robonaut

uses:

Helmet Mounted Display

Force and tactile feedback gloves

Position tracking

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Robonaut: external interface

through an Application Programmer's Interface (API)

every degree of freedom is available to be controlled remotely

Robonaut API is compatible with RoboSim, allowing development under safety of simulation

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RoboSim: what is it?

Simulation of Robonaut on Windows PC

RoboDisplay: what is it?

Graphics program that depicts the orientation of all the joints of the Robonaut

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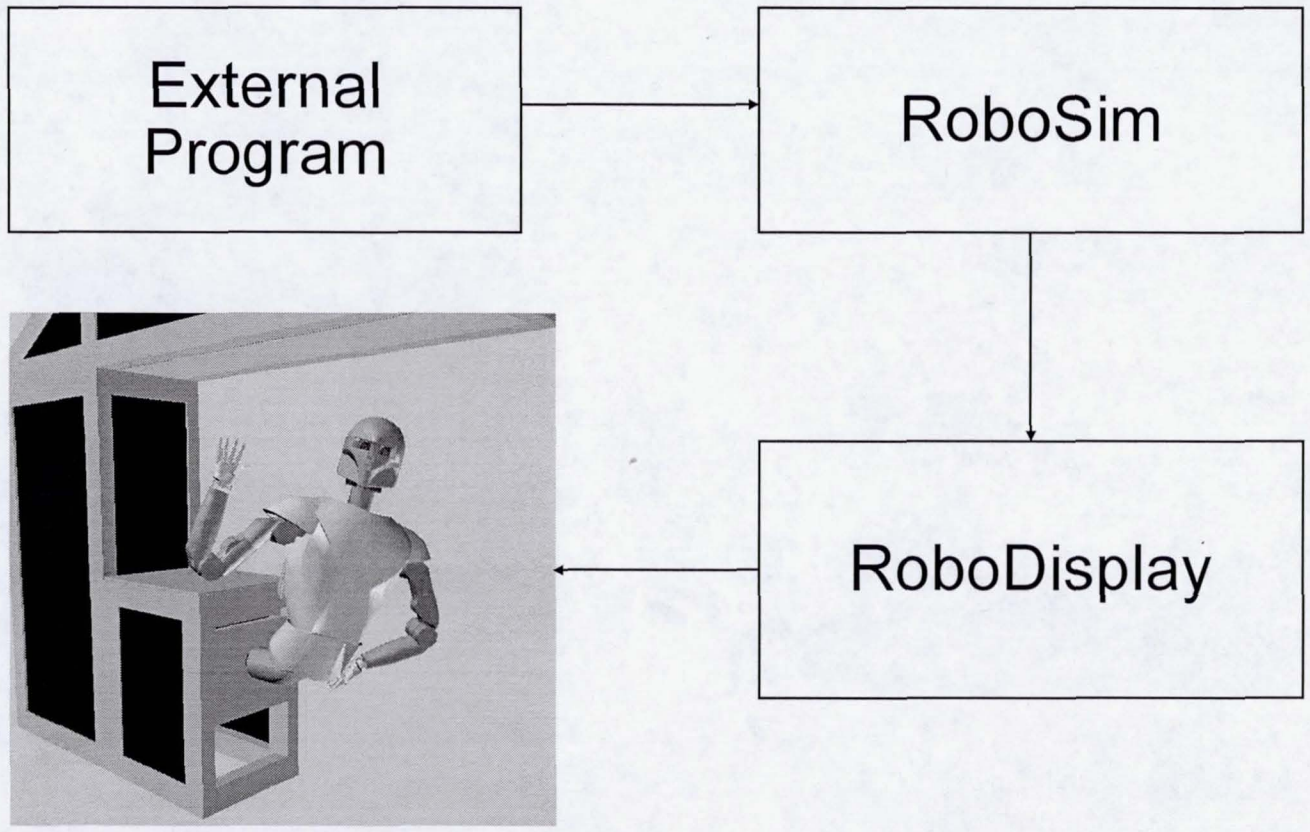

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RoboSim: why is it?

testing unverified control algorithms on robotics hardware is risky

too many users, too little time

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RoboSim: advantages

test new theories

test new algorithms

test new software

train new personnel

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RoboSim:

requires a configuration file

RoboDisplay:

requires models and a structure file